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Przytulla

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[54] DEVICE FOR BLOW MOLDING A HOLLOW BODY

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[51] Int. Cl.<sup>5</sup> ..... B29C 49/20

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264/534; 425/522

[58] Field of Search ..... 425/522, 525; 264/531,  
264/533, 534; 220/319, 320, 355, 85 D, 85 H;  
215/275, 100 A

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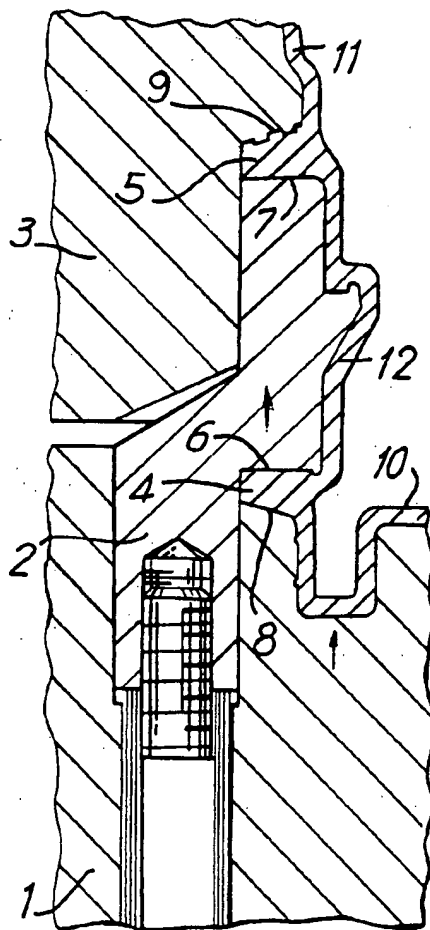
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[57] ABSTRACT

Device for blow molding a hollow body with a blow molding device in which at least two solid flange rings are molded in the circumferential wall of the hollow body from the same thermoplastic synthetic material of the hollow body. The flanges are formed by compressing and fusing the material with a tandem slide. The movable slide parts travel unlike distances at unlike speeds of movement.

4 Claims, 2 Drawing Sheets



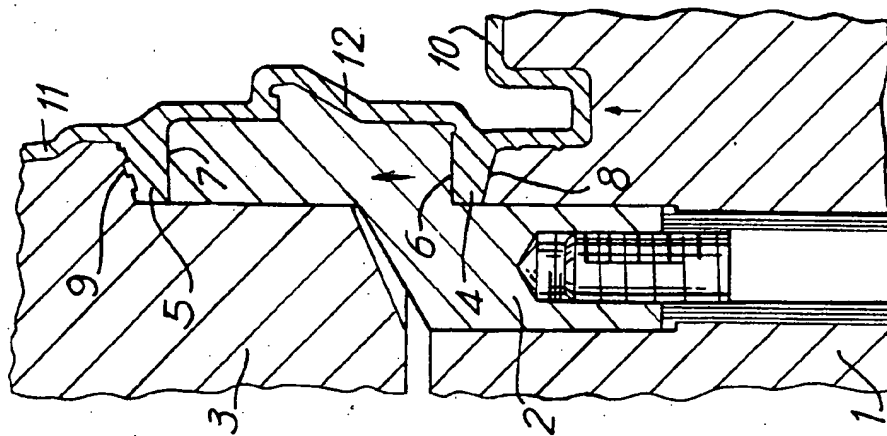


FIG. 3

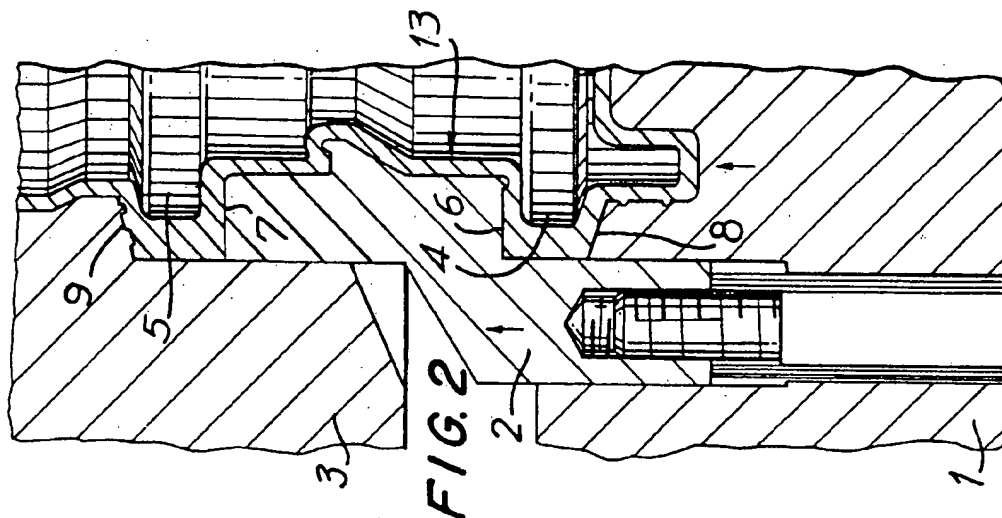


FIG. 2

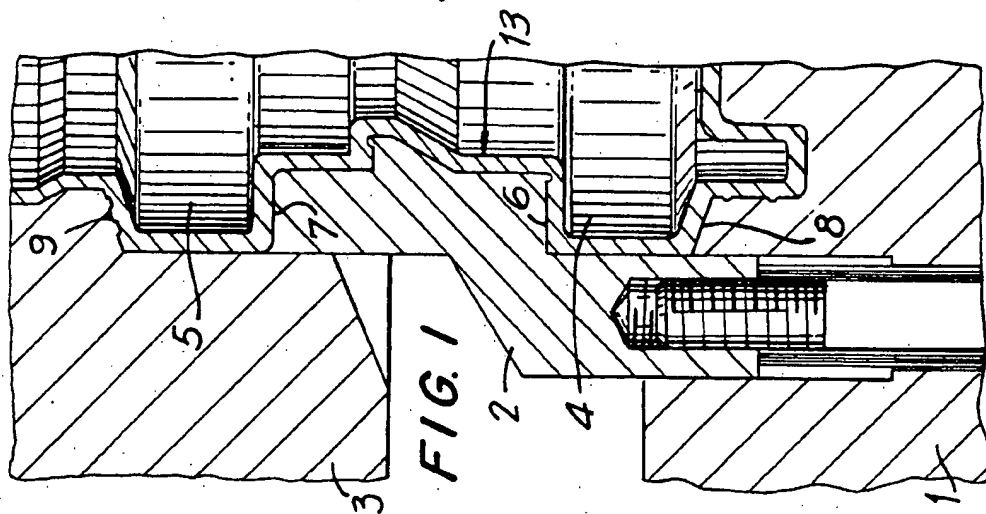


FIG. 1

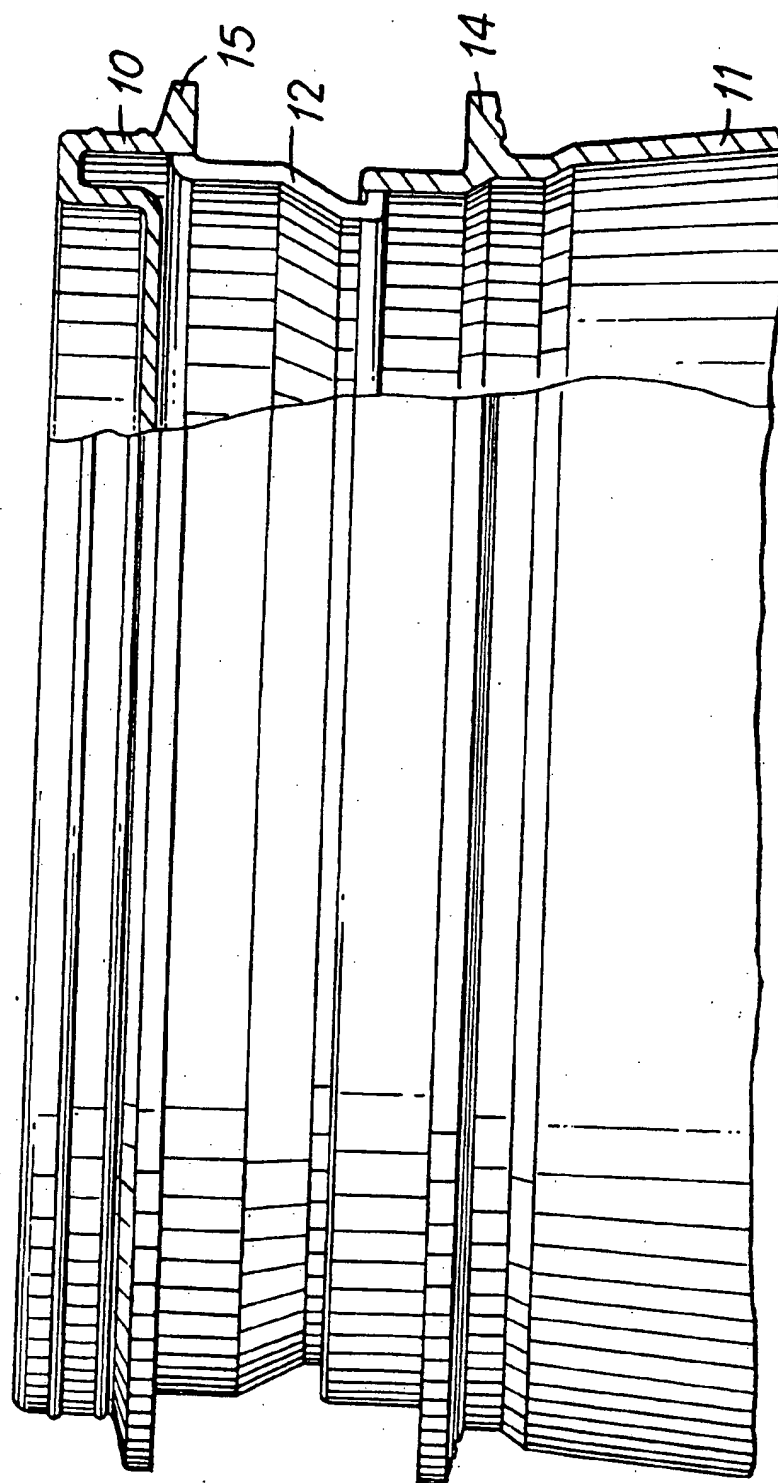


FIG. 4

## DEVICE FOR BLOW MOLDING A HOLLOW BODY

### BACKGROUND OF THE INVENTION

Devices are known for blow molding a hollow body of thermoplastic synthetic material having a flange ring projecting outward from the circumferential wall of the hollow body. These blow molding devices typically have a recess along a continuous annular region in which an external flange ring of the hollow body is formed after the initial blowing process. The flange ring is produced by compressing the wall portion of the hollow body, where it is located in the annular recess, into a solid ring by driving a movable mold slide in an axial direction toward another mold part.

Flanges on vessels of synthetic material may be made using a prefabricated flange part. Thus it is known, for example, that a prefabricated flange may be placed in a blow molding device as a separate injection molded part. This flange may then be welded on the outer wall of the vessel in the manufacturing process or blow molding of the vessel.

The flange rings formed by blow molding from the wall of the hollow body or with a prefabricated flange part are used in closed hollow bodies, for example, bunged vessels, as roll hoops or transport rings. In parallelepiped hollow bodies, the closed flanged projections alternatively serve as wall reinforcements.

Vessels of synthetic material capable of use with lids of synthetic material; that is, the so-called wide-mouth drums, are generally understood to include large-volume containers or vessels, for example, of 220-L capacity, having a fill opening and a lid which is essentially the same size as the diameter of the vessel. In these constructions, the flange ring of the vessel consists of a compressed surface flange which, for example, pursuant to U.S. Pat. No. 4,177,934 is arranged at some distance under the vessel opening. Against this flange rests a cooperating flange of the turned-up lid of the vessel. The lid, in turn, sits on the neck of the opening of the vessel.

The lid-edge flange conforms in its radial extension with the surface flange of the vessel and transmits stacking forces into the wall of the vessel in the axial direction. In the locked position, the lid is fastened on the vessel by a clamping ring engaging over the lid edge flange on the one hand and engaging under the vessel surface flange on the other.

Lids of hard synthetic material for vessels are customarily pre-fabricated as injection molded parts in a separate operation. In addition to a separate injection molding manufacturing process, special injection molding tools are likewise required for this.

### SUMMARY OF THE INVENTION

In accordance with the present invention, the vessel and lid are produced in one operation in the blow-molding process using a single blow molding device. Pursuant to the invention, this is accomplished by means of a structural blow-molding device having two annular, axially displaceable mold slides.

Owing to the special design of the blow-molding device, with the two axially displaceable or tandem slides, the vessel and lid production may be combined in a single device. This substantially speeds up manufac-

ture and makes it less costly. Additional machine and tool expenditures are eliminated.

Joint vessel and lid production is effected by the method pursuant to the invention by means of a single blow molding device in that the hollow body and an associated lid are simultaneously blown in the blow molding device in one operation. After molding of the finished blown product, the lid or a disposable connecting ring lying between the lid and the body of the vessel need only be separated from the latter make the body of the vessel and the lid independent.

The invention is not limited to rotationally symmetric hollow bodies, for example drums; but alternatively relates to parallelepiped hollow bodies such as, for example, canisters or bottle-like containers with, for example, a rectangular or square cross section.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial cross-sectional view of the blow molding device with the slides open and the blown tube of synthetic material disposed against the wall of the molding device;

FIG. 2 is a view similar to FIG. 1 with the slides moved in the direction of the axis of the mold;

FIG. 3 is a view similar to FIG. 1 with the slides closed; and

FIG. 4 is a view of the vessel-lid unit, partly in cross-section, after removal from the blow molding device.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

For better visualization, only the mold sector of interest to an understanding of the invention is shown in the drawings.

According to FIG. 1, an annular mold slide 2 is inserted between the mold slide 1 and the stationary mold part 3. Both mold slides are displaceably guided in the direction of the axis of the mold. One end of the mold slide 2 is slidable in the mold slide 1 and the other end in the stationary mold part 3.

When the mold is open, the blown tube 13 of synthetic material rests against the inner contours of the mold, as shown in FIG. 1. An annular recess 4 is defined by the face 6 of the annular slide 2 and the face 8 of the mold slide 1. This annular recess contains the material from which the flange on the lid is to be formed. The face 7 of the annular slide 2 and the face 9 of the stationary mold part 3 define a second annular recess 5. This annular recess contains the material from which the flange on the vessel for the vessel is to be formed. The circumferential walls in the corresponding mold parts 2 and 3 define the radial extension of the annular recesses 4 and 5.

In the still weldable hot state of the blown tube 13, mold slide 1 and annular slide 2 are moved axially of the mold in the direction of the stationary mold part 3. The speed of movement of the annular slide 2 is lower and its extent of movement is shorter than the speed of movement and extent of movement of the mold slide 1.

FIG. 2 shows the blow molding device in a state in which the displaceable mold parts 1 and 2 have traveled about half the closing path in the direction of the arrow. Then only the tube material lying in the annular recesses 4 and 5 is pressed together until, according to the end position shown in FIG. 3, it is compressed and fused into the solid flange rings 14 and 15 (FIG. 4). The movable mold parts 1 and 2 reach their end position of travel at the same time.

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In FIG. 4, the cross-sectional part of the vessel-lid unit taken from the side of the vessel as shown in FIGS. 1-3 and inverted. It is to be added that the whole mold is divided in two in the longitudinal or axial direction and the two mold halves are movable transversely of the longitudinal direction into the opening and closing positions.

In FIG. 4 the vessel 11 and lid 10 are still joined by an intermediate annular member 12. This disposable connecting ring 12 between vessel 11 and lid 10 is next cut out, so that vessel 11 and lid 10 become independent parts. For better identification, the ring 12 to be severed is not shaded in FIG. 4. The blow molding device may alternatively be designed so that the disposable intermediate ring 12 is eliminated.

With the present invention, the vessel and lid consist of the same synthetic material formed from a single blown tube and have a like grain. Thus the vessel and lid have the same color.

I claim:

1. A blow molding device for blow molding a hollow body of thermoplastic synthetic material having two flange rings projecting radially outwardly from the circumferential wall of the hollow body, the device comprising:

- a) a stationary blow mold part (3);
- b) a first mold slide (2) displaceable axially with respect to said stationary mold part (3) between a first position and second position, said first mold slide having a first mold portion spaced axially from said mold part to define a first annular recess (5) therebetween when said first mold slide is in said first position and for producing a first flange ring (14) on the circumferential wall of said hollow body upon axial movement of said first mold slide (2) to said second position; and
- c) a second mold slide (1) displaceable axially with respect to said first mold slide (2) between a first position and a second position, said second mold slide having a second mold portion spaced axially

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from the first mold slide, on the axial side thereof opposite said stationary mold part (3), to define a second annular recess (4) therebetween when said second mold slide is in said first position and for producing a second flange ring (15) in the circumferential wall of said hollow body upon axial movement of said second mold slide to said second position.

2. A blow molding device according to claim 1 wherein:

- a) the stationary mold part includes a face (9) facing axially toward said first mold slide;
- b) the first mold portion of said first mold slide (2) includes a first face (7) facing axially toward said stationary mold part in axial alignment with the face (9) thereof to define said first annular recess;
- c) the first mold slide includes a second face (6), facing axially toward said second mold slide; and
- d) the second mold portion of said second mold slide includes a face (8) facing axially toward said first mold slide and in axial alignment with the second face (6) thereof to define said second annular recess.

3. A blow molding device according to claim 1 wherein:

- a) the first mold slide (2) is slidably mounted on said second mold slide (1) for simultaneous axial movement therewith.

4. A blow molding device according to claim 1 wherein:

- a) the first mold slide (2) is slidably mounted on said second mold slide (1) for simultaneous axial sliding movement therewith, from said first position to said second position and at a speed less than the speed of axial movement of said second mold slide from said first position to said second position, with both mold slides reaching their second position at the same time.

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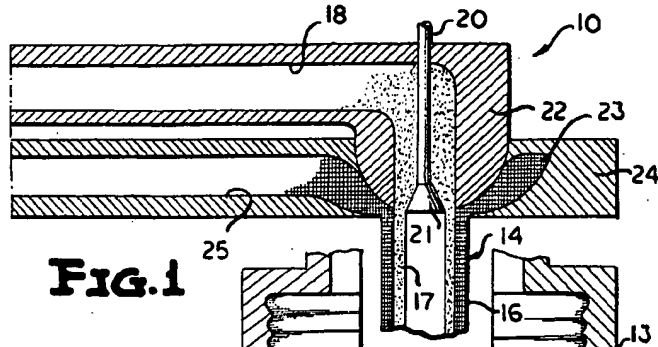
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M. J. KLYGIS

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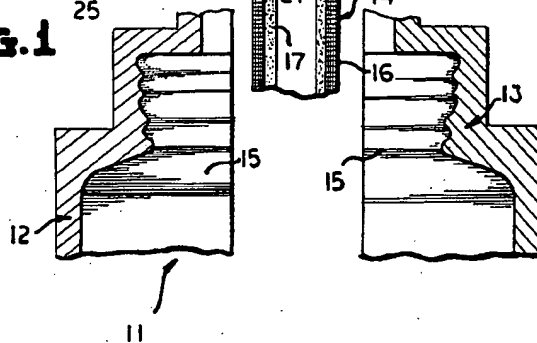
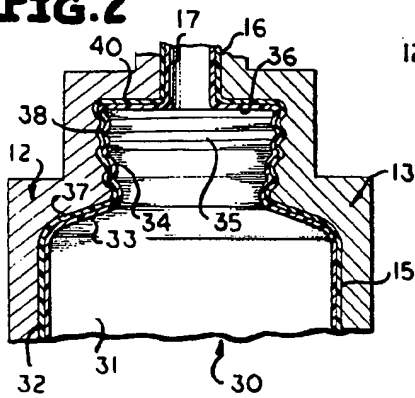
METHOD OF MOLDING DUAL WALL CONTAINER AND CLOSURE

Filed Jan. 19, 1965



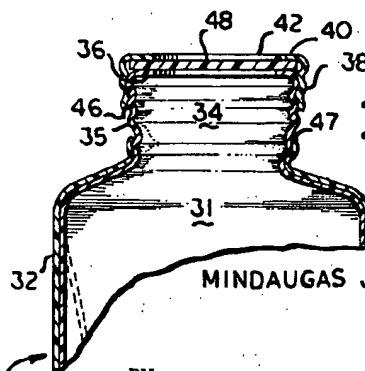
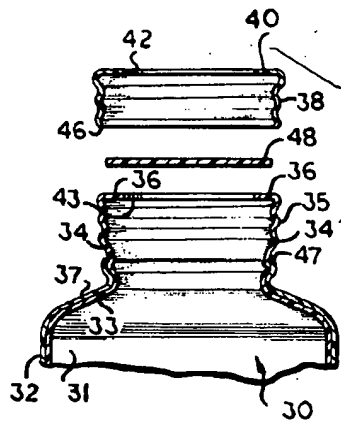
**FIG. 1**

**FIG. 2**



**FIG. 3**

**FIG. 4**



**FIG. 5**

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## METHOD OF MOLDING DUAL WALL CONTAINER AND CLOSURE

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9 Claims. (Cl. 264—98)

This invention generally relates to the art of forming hollow articles by the expansion of tubing within a mold and primarily seeks to provide a novel method for forming hollow articles of a dual wall construction wherein a portion of one of the walls forms a neck of the container and a portion of another wall forms a closure portion which is removable from the neck portion and is adapted for re-application to the neck portion for reclosing the dual walled articles.

At the present time, hollow articles, such as plastic bottles are formed from a continuously extruded tube of a generally constant wall thickness. As the tube is extruded it is gripped by molds, and sections of the tube are isolated and sealed at their ends, after which, fluid under pressure is introduced into the isolated sections to expand the tube to conform to the shape of the mold cavity. Such hollow articles are generally provided with necks which are closed when the sections of the tube are sealed by the molds. This sealed portion of the tube adjacent the neck must be removed by a severing operation to open the neck and form the opening or mouth of the bottle.

Closures are generally provided for such hollow articles by any one of a variety of different methods which generally bear little relationship to the formation of the hollow articles except for the fact that the closures are designed to complement the necks of the hollow articles. For example, the closures associated with externally threaded necks of bottles are provided with internal threads which complement the threads of the bottle necks, and except for this complementary relationship between the bottle necks and the closures, there need be little if any relationship between the method by which the bottles are manufactured and the method by which the closures are manufactured.

It is therefore an object of this invention to provide a novel method of producing hollow articles, such as bottles, of a dual wall construction and simultaneously therewith, form closures for such dual wall articles or containers by simultaneously extruding coaxial tubular members, confining the members in a mold, expanding the members to the configuration of the mold to form coaxial container bodies terminating in closure and neck portions, removing the container from the mold, and removing the closure portion by a severing operation thereby simultaneously forming both a container and a closure portion therefor.

A further object of this invention is to provide a novel method of simultaneously producing dual wall containers and closures comprising the steps of extruding an outer tubular plastic member, simultaneously extruding an inner tubular plastic member coaxial with the outer tubular member, confiningly expanding both members to form a dual wall container terminating in closure and neck portions, simultaneously forming complementary locking portions in each of the closure and neck portions, and removing the closure portion of the outer member from the neck portion of the inner member by peripherally severing the latter closure portion and disengaging the locking portion thereof from the locking portion of the neck portion of the inner member.

A further object of this invention is to provide a novel method of producing a dual wall container including each of the steps immediately above described, and in addition,

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tion, including the steps of forming an axial opening in an end wall of the removed closure portion, and thereafter securing a disc-like member to the closure portion to close the opening in the closure portion.

A further object of this invention is to provide a novel method of producing a dual wall container and closure comprising the steps of forming a pair of coaxial tubular members, contouring a portion of one of the members to form a closure portion, contouring a portion of another of the members to form a neck portion and removing the closure portion from the remainder of the one member whereby the closure portion is adapted for re-application upon the neck portion of the other tubular member after having been once removed therefrom.

With the above, and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawing.

In the drawing:

FIGURE 1 is a fragmentary sectional schematic view of an extrusion head and a split mold, and illustrates the extrusion of a pair of coaxial plastic members and the introduction thereof into the split mold.

FIGURE 2 is a fragmentary schematic sectional view of the split mold of FIGURE 1, and illustrates the expansion of the tubular members to conform to the shape of the mold cavity.

FIGURE 3 is a fragmentary elevational view with a part shown in section, and illustrates the selected severing of two portions of a dual wall container formed from the pair of coaxial tubular plastic members to form a closure portion having an axial opening in an end wall thereof.

FIGURE 4 is a fragmentary exploded sectional view of the dual wall container of FIGURE 3 after the closure portion has been severed and removed, and illustrates the disc for closing the axial opening of the closure portion.

FIGURE 5 is a fragmentary sectional view of the dual wall container of FIGURE 4, and illustrates the various components of the dual wall container in their assembled condition.

In the example embodiment of the invention illustrated herein, a coaxial extrusion die 10 is used in conjunction with a pair of conventional extruding machines, or extruders (not shown) for forming dual wall hollow articles from coaxial tubes, tubing or tubular members. In such machines, a plurality of molds, such as a split mold 11, are mounted on a common shaft and are rotated in a common plane. Each of the molds is formed in halves 12 and 13 which are opened to receive an extruded coaxial tube 14. The coaxial tube 14 is continuously extruded by the extruders with the mold halves 12, 13 passing on opposite sides of the extrusion die 10.

As the mold halves 12, 13 close, they close about a portion of the coaxial tube 14 and the molds are so designed that they pinch the tube so as to seal off opposite ends of the section disposed within the mold 11. As the mold halves 12, 13 grip the tube, an injection needle passes through the tube and once the mold halves have completely closed and seal the opposite ends of the tube sections, fluid preferably air under pressure, is introduced into the tube with the result that the tube is internally expanded and assumes the shape of a cavity 15 in each of the mold halves 12, 13.

The particular material forming an outer tube 16 of the coaxial tube 14 may vary, but is preferably polystyrene or similar plastic material which is relatively rigid upon setting while an inner tube 17 of the coaxial tube 14 is preferably constructed from polyethylene or similar plastic material which is relatively flexible.

The material forming the inner tube 17 of the co-

axial tube 14 is fed from one of the extruders through an extension or conduit 18 which is preferably heavily insulated or heated in a conventional manner to maintain the extruded material in a plasticized state. A conventional adjustable metering member or valve 20 having a head 21 is mounted in an offset portion 22 of the extension 18.

The offset portion 22 is received in a chamber 23 of a head 24 forming a portion of a conduit or extension 25 of another extruder. The polystyrene extruded through the conduit 25 is similarly maintained in a plasticized state by suitably heating the conduit 25 or insulating the same thereby urging the plasticized polystyrene outwardly of the chamber 23 to form the outer tube 16 coaxial with the inner tube 17 in a manner clearly illustrated in FIGURE 1 of the drawings.

After the coaxial tube 14 has been formed and the split mold halves 12 and 13 of the mold 11 close in the conventional manner heretofore described, air is introduced into the interior of the inner tubular member 17 to expand both members to the general contoured configuration of the cavity 15 in the manner clearly illustrated in FIGURE 2 of the drawings.

This expansion or blow-molding of the coaxial tube 14 forms a dual wall container 30 which is closed at axial end portions thereof (not shown) at the points where the coaxial tube 14 is gripped and sealed by the closed mold sections 12 and 13.

The dual wall container 30 comprises a pair of substantially identical container bodies 31 and 32. The container body 31 includes an annular shoulder portion 33 and an upstanding neck 34 which is threaded at 35. The upstanding neck 34 terminates in an end portion 36 adjacent an upper end portion of the inner tubular member 17.

The container body 32 is formed from the material of the outer tubular member 16 and similarly includes an annular shoulder 37 integrally joined to an internally threaded closure portion 38 which overlies and complements the threaded neck portion 34 of the inner coaxial container body 31. The closure portion 38 terminates in an end portion 40 adjacent the upper end portion of the outer tubular member 16.

After the sections 12 and 13 of the mold 11 have been opened, the dual wall container 30 is removed therefrom and portions of the end portions 36 and 40 are removed by a conventional severing operation, as is best illustrated in FIGURE 3 of the drawing. In this case, a relatively sharp knife edge 41 is introduced through both of the end portions 36 and 40 and the dual wall container 30 is rotated in a conventional manner about its own axis to cut respective openings 42 and 43 in the closure portion 38 and the neck portion 34 of the respective container bodies 32 and 31 (FIGURE 4). Simultaneously with the formation of the axial openings 42 and 43, a cutting tool 44 having a contoured cutting edge 45 (FIGURE 3) is advanced in a direction substantially normal to the axis of the dual wall container 30 adjacent the shoulder 37 of the container body 32 to remove a narrow peripheral band of material (not shown) from the material of only the closure portion 38. No severing of the neck portion 34 of the inner container body 31 occurs, as is clearly shown in FIGURE 3 of the drawings. This peripheral severing or removal of material by the tool 44 forms a terminal peripheral edge 46 (FIGURE 3) of the closure portion 38 and an opposing upper terminal edge 47 on the outer container body 32. The removal of this peripheral band of material frees the closure portion 38 from the remainder of the outer container body 32 and by merely rotating the closure 38, the same is removed from the threaded neck portion 34 of the inner container body 31, as is shown in FIGURE 4 of the drawing.

After the closure portion 38 has been removed from the neck portion 34 of the dual container 30, a circular disc 48 of plastic material, such as polystyrene, is se-

cured in the interior of the closure portion 38 to the remaining portion of the end wall 40 in any conventional manner, such as, for example, by a heating sealing operation, to close the opening 42 in the closure 38, as is shown in FIGURE 5 of the drawing. The closure portion 38 with the disc 48 can now be re-applied to the neck portion 34 of the dual wall container 30 to close the opening or mouth 43 in the neck portion 34 in the manner clearly illustrated in FIGURE 5.

The dual wall container 30 of FIGURE 5 is particularly adapted for packaging vacuum-filled products. To this end the outer container body 32 is constructed from relatively rigid polystyrene material, as has been heretofore noted, which prevents the collapsing of the dual wall container 30 when a vacuum is drawn during a conventional vacuum-filling operation. Therefore, even though the relatively flexible polyethylene material of the inner container body or lining 31 tends to bow radially inwardly when air is evacuated from the container 30, as shown in phantom outline in FIGURE 5, the outer rigid container body 32 maintains the rigidity of the dual wall container 30 and prevents the collapsing thereof.

It will also be readily apparent that the opening 42 in the closure portion 38 can be closed without removing the closure portion 38 from the neck portion 34 of the dual wall container 30. That is, after the openings 42 and 43 have been formed in the manner described in the consideration of FIGURE 3, and the narrow peripheral band of material has been removed from the closure portion 38, the container 30 can be filled by introducing a product directly through both openings 42 and 43 and thereafter securing the disc member 48 to the top of the remaining end wall portion 40. This, of course, would not require the removal of the closure portion 38 prior to the filling operation and provides an advantageous and economical method of packaging a product in the container 30.

While the dual wall container 30 is preferably constructed with a flexible inner container body 31 and a more rigid outer container body 32, this construction can be reversed to form the outer container body 32 of a less rigid and more flexible nature than the inner container body 31, by merely extruding the polyethylene and the polystyrene through the respective extruder extensions 25 and 18 of the extrusion die 10 and blow-molding the thus formed coaxial tubular member in the mold cavity 15 of the mold 11 in the manner heretofore described.

It is also considered within the scope of this invention to remove the entire end wall portions 36 and 40 of the respective container bodies 31 and 32 and peripherally sever the neck portion 34 of the inner container body 31 in a manner identical to the peripheral severing of the closure portion 38 of the outer container body 32. This construction would transform the neck portion 34 of the container body 31 into a removable externally threaded closure portion to which a disc, such as the disc 48, can be secured. In this case, the closure portion 38 would function as a neck portion to receive the externally threaded closure portion formed from the neck portion 34 of the inner container body 31. Therefore, while the portion 38 of the outer container body 32 has been specifically described as a closure portion and the portion 34 of the inner container body 31 has been described as a neck portion, it is to be understood that the neck portion 34 can be constructed as a closure member when peripherally severed in the manner heretofore described while the closure portion 38 would function as the neck of the dual wall container 30.

While the closure portion 38 and the neck portion 34 of the container 30 are complementary threaded to form the locking means for threadably securing the closure to the container as shown in FIGURE 5, it is also within the scope of this invention to form the closure and neck portion with any conventional complementary locking means for securing the closure to the container.

From the foregoing, it will be seen that novel and advantageous provision has been made for carrying out the desired end. However, attention is again directed to the



fact that variations may be made in the example method and article disclosed herein without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A method of producing a multi-wall container comprising the steps of forming at least a pair of coaxial telescopic tubular members, contouring a portion of one of the members to form a closure portion and simultaneously contouring a portion of the other of the members to form a complementary contoured neck portion in generally telescopic relationship with said closure portion, simultaneously forming complementary locking portions in each of the closure and neck portions during the contouring thereof, and removing the closure portion from the remainder of the one member whereby the closure portion is adapted for reapplication upon the neck portion of the other member by the respective disengagement and re-engagement of the locking portions.

2. The method of producing a multi-wall container as defined in claim 1 wherein the tubular members initially each have axially opposite closed ends and further including the step of forming an opening in an end wall portion of both the closure and neck portions whereby the opening in the latter portion defines a mouth of the multi-wall container.

3. The method of producing a multi-wall container as defined in claim 2 including the step of closing the opening in the closure portion to complete the formation thereof.

4. A method of producing a multi-wall container comprising the steps of simultaneously extruding at least a pair of coaxial telescopic tubular members, contouring a portion of one of the members to form a closure portion and simultaneously contouring a portion of the other of the members to form a complementary contoured neck portion in generally telescopic relationship with said closure portion, performing the simultaneous contouring of said portions by confining the members in a mold and expanding the members to the configuration of the mold, and removing the closure portion from the remainder of the one member whereby the closure portion is adapted for reapplication upon the neck portion of the other member.

5. The method of producing a multi-wall container as defined in claim 4 wherein the tubular members each have axially opposite closed ends whereby upon the expansion thereof said neck portion is closed by an end wall of the innermost of said members.

6. The method of producing a multi-wall container as defined in claim 4 wherein the closure portion is removed from the remainder of the one member by peripherally severing the closure portion whereby the severed closure portion is rendered removable from and adapted for subsequent reapplication to the neck portion.

7. The method of producing a multi-wall container as defined in claim 4 including the steps of forming an opening in at least an end portion of the closure portion, and subsequently closing the opening in the end portion.

8. The method of producing a multi-wall container as defined in claim 4 including the step of forming an opening in an end wall of the closure portion and the end wall of the neck portion whereby the opening in the latter portion defines a mouth of the multi-wall container.

9. The method of producing a multi-wall container as defined in claim 4 wherein the tubular members possess ing formed from the stronger tubular member and the neck portion being formed from the weaker tubular member.

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